

THE EFFECT OF USING CALCIUM CHLORIDE IN G CLASS CEMENT ON STARTING TIME AND CEMENT PRESSURE

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Abstrak

Drilling operations always require fluid in their activities. Because to penetrate the soil and rocks will be very easy with the use of fluid. The fluid will help soften the soil and rocks making it easier for the drill bit to penetrate it. Drilling fluid is also needed to attach the casing to the drill wall. So that the wall does not collapse, as media logging and so on. Of course, each drilling zone (surface zone, intermediate zone, and production zone) has different characteristics and different additive substances are needed. This study wants to find out the function of the use of calcium chloride additives on the nature of cement hardness and choking time. This research is important because it will be known this additive nature as a retarder or accelerator. By knowing the nature of this additive so that it can be used in the right zone. Testing on Calcium Chloride additive for the value of compressive strength is very effective at a concentration of 8%, 24-hour immersion time and a temperature of 150 ° F with a test result of 4483 psi. Whereas, at temperatures of 80 ° F and 100 ° F, the maximum value of compressive strength for Calcium Chloride additive occurs at a concentration of 10% with a test result of 2393 psi and 2888 psi. Based on the data presented, temperature plays an important role in testing the thickening time of a cement sample. The addition of calcium chloride additive functions as an accelerator.

Keyword: calcium chloride, thickening time, compressive

1. PRELIMINARY

Drilling operations always require fluid in their activities. Because to penetrate the soil and rocks will be very easy with the use of fluid. The fluid will help soften the soil and rocks making it easier for the drill bit to penetrate it.

Historically, the first use of fluid was using water, but there were many problems encountered in the borehole. Problems that are often encountered are swelling events. Because the problem is made additive substances to overcome this.

Drilling fluid is also needed to attach the casing to the drill wall. So that the wall does not collapse, as media logging and so on. Of course, each drilling zone (surface zone, intermediate zone and production zone) has different characteristics and different additive substances are needed.

This study wants to find out the function of the use of calcium chloride additives on the nature of cement hardness and choking time. This research is important because it will be known this additive nature as a retarder or accelerator. By knowing the nature of this additive so that it can be used in the right zone.

2. THEORY

Cementing is the most important factor in drilling operations so that it can reduce the possibility of problems when drilling on the next route. According to the reasons and objectives, cementing can be divided into two, namely Primary

Cementing and Secondary Cementing (second cementing or improvement).

2.1 Primary Cementing

In primary cementing, cementing the casing on the wellbore wall is influenced by the type of casing to be cemented. The stages in primary cementing include:

- Cementing the conductor casing aims to prevent drilling fluid contamination (drilling mud) from the surface soil layer.
- Cementing surface casing aims to protect ground water from being polluted from drilling fluid, strengthen surface casing position as a place to install BOP (Blow Out Preventer) equipment, to hold casing loads underneath and to prevent drilling fluid or formation fluid from occurring going through the surface casing.
- Cementing of intermediate casing aims to close abnormal formation pressure or to isolate lost circulation areas. Cementing production casing aims to prevent the occurrence of flow between formation or fluid flow of unwanted formations that will enter the well.
- Cementing production casing aims to isolate the productive zone which will be produced perforated completion and also to prevent corrosion of the casing caused by corrosive materials.

2.2 Secondary Cementing

Cementing activities are carried out after primary cementing, or in other words, cementing the second stage. The aim of cementing is:

- Repair cementing if there is damage at the Primary cementing stage.
- Separating productive zones from non-productive zones.

In Secondary Cementing can be divided into several stages, namely:

- Squeeze Cementing is a stage 2 activity in cementing which aims to improve cementing results in the primary cementing if it is unsatisfactory and fixes leaks that occur in the casing. This cementing activity is carried out during the drilling operation.
- Re-Cementing is a cementing activity that is included in the second stage. The purpose of this cementing is to improve the failed primary cementing and to extend the protection of the casing above the cement top.
- Plug-back cementing includes cementing the second stage which was last done after primary cementing was completed. The purpose of Plug-back Cementing is to close or leave the well (abandoning the well), to close the water zone in order to reduce the water-oil ratio in the open hole completion.

3. RESULTS AND DISCUSSION

3.1 Penambahan Additive Sodium Calcium Chloride

The following is the basic calculation for the composition of cement slurry and the addition of *Calcium Chloride* additive by 0;2;4;6;8; and 10% with temperature variations of 80 ° F, 100 ° F, and 150 ° F and 24-hour immersion time.

Table 1.

Test results of Compressive Strength with additional *Calcium Chloride* at temperatures of 80 ° F and 24 hours

No	water (ml)	Cement (gram)	INFORMATION		
			Aditif		Compressive Strength (psi)
			%	gram	
1	348.533	792.121	0	0	1229
2	348.533	782.84	2	15.7	1463
3	348.533	773.402	4	31.12	1694
4	348.533	763.801	6	46.27	1928
5	348.533	754.033	8	61.16	2159
6	348.533	744.094	10	75.79	2393

Table 2.

Test results of Compressive Strength with additional *Calcium Chloride* at temperatures of 100 ° F and 24 hours

No	water (ml)	Cement (gram)	INFORMATION		
			Aditif		Compressive Strength (psi)
			%	gram	
1	348.533	792.121	0	0	1539
2	348.533	782.84	2	15.7	1829
3	348.533	773.402	4	31.12	2119
4	348.533	763.801	6	46.27	2409
5	348.533	754.033	8	61.16	2700
6	348.533	744.094	10	75.79	2888

Table 3.

Test results of Compressive Strength with additional *Calcium Chloride* at temperatures of 150 ° F and 24 hours

No	water (ml)	Cement (gram)	INFORMATION		
			Aditif		Compressive Strength (psi)
			%	gram	
1	348.533	792.121	0	0	2893
2	348.533	782.84	2	15.7	3182
3	348.533	773.402	4	31.12	3616
4	348.533	763.801	6	46.27	4048
5	348.533	754.033	8	61.16	4483
6	348.533	744.094	10	75.79	3842

In reading table 1 to table 3, it can be seen that the decrease continues to occur because the nature of the additive is to accelerate the drying time. So what happens is that the compressive strength value can get smaller. This additive is used in the cementing zone inside because the results obtained at a given temperature of 150 ° F are the highest.

The results in the table are presented in the graph in figure 1. Can the pattern graph show a positive trend the more additive the higher the value of the compressive structure.

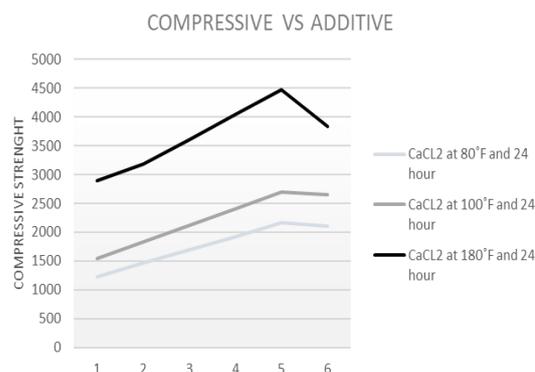


Figure 1. Compressive vs Additive

3.2 Thickening time Test Results

Thickening time is the time needed for cement suspension to reach consistency of 100 Bc (Unit Of Consistency). Consistency of 100 Bc is the limit for cement suspension can still be pumped again. The researcher must formulate the additive with the appropriate amount to get an accurate thickening time value. From the results for cement samples with additional *Calcium Chloride* additives can be seen in full in the table and below.

In addition to the sodium lignosulfonate additive the concentration given is 0; 2; 4; 6; 8 and 10. The following is a table of research results for the addition of *Calcium Chloride* additives with temperature variations of 80 ° F, 100 ° F, and 150 ° F.

Table 4.

Test results of Thickening time with additional *Calcium Chloride* at temperatures of 80 ° F and 24 hours

No	water (ml)	Cement (gram)	INFORMATION		Thickening Time (menit)
			Aditif		
			%	gram	
1	348.533	792.121	0	0	165
2	348.533	782.84	2	15.7	135
3	348.533	773.402	4	31.12	120
4	348.533	763.801	6	46.27	105
5	348.533	754.033	8	61.16	90
6	348.533	744.094	10	75.79	60

Table 5.

Test results of Thickening time with additional *Calcium Chloride* at temperatures of 100 ° F and 24 hours

No	water (ml)	Cement (gram)	INFORMATION		Thickening Time (menit)
			Aditif		
			%	gram	
1	348.533	792.121	0	0	135
2	348.533	782.84	2	15.7	120
3	348.533	773.402	4	31.12	105
4	348.533	763.801	6	46.27	90
5	348.533	754.033	8	61.16	75
6	348.533	744.094	10	75.79	45

Table 6.

Test results of Thickening time with additional *Calcium Chloride* at temperatures of 150 ° F and 24 hours

No	water (ml)	Cement (gram)	INFORMATION		Thickening Time (menit)
			Aditif		
			%	gram	
1	348.533	792.121	0	0	105
2	348.533	782.84	2	15.7	90
3	348.533	773.402	4	31.12	75
4	348.533	763.801	6	46.27	60
5	348.533	754.033	8	61.16	45
6	348.533	744.094	10	75.79	30

The results in the table are presented in the graph in Figure 2. It can be seen in the graph the pattern shows that more additives decrease the value of the Ticking Time.

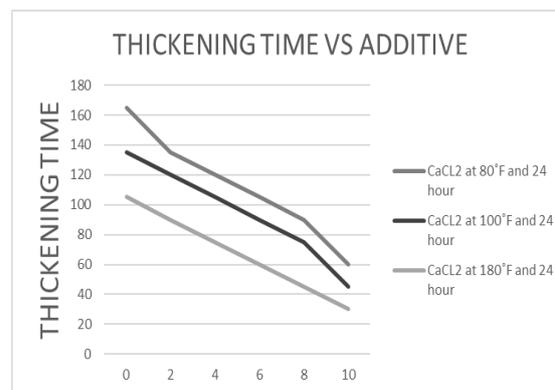


Figure 2. Thickening Time vs Additive

4. CONCLUSION

From the analysis carried out in this study conclusions can be drawn as follows:

1. Testing the Calcium Chloride additive for the value of compressive strength is very effective at a concentration of 8%, 24-hour immersion time and a temperature of 150 ° F with a test result of 4483 psi. Whereas, at temperatures of 80 ° F and 100 ° F, the maximum value of compressive strength for Calcium Chloride additive occurs at a concentration of 10% with a test result of 2393 psi and 2888 psi.
2. Based on the data that has been presented, temperature plays an important role in testing the thickening time of a cement sample. The addition of calcium chloride additive functions as an accelerator.

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